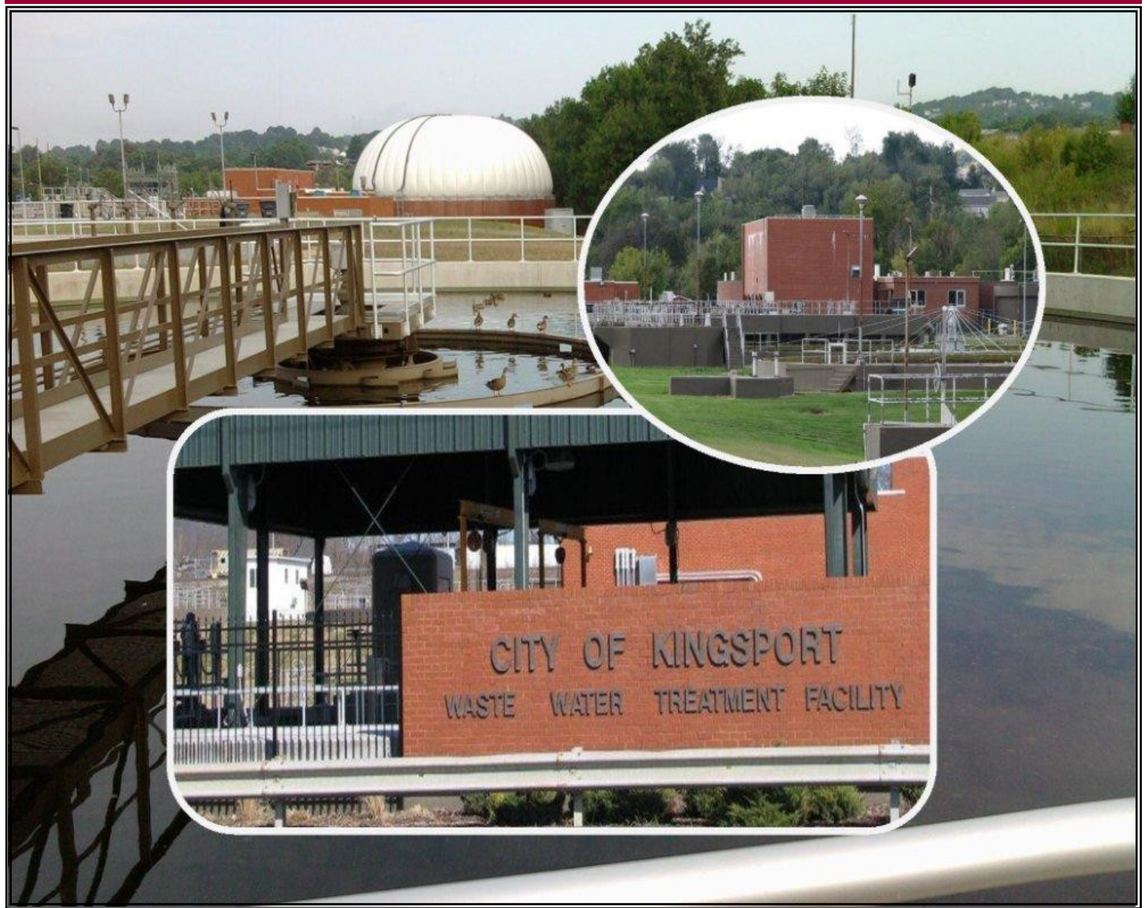
City of Kingsport



Wastewater Treatment

Plant Dedication
April 26, 2012

Wastewater Plant Data

Average Daily Design Flow 8.5 MGD

Peak Hourly Flow 35 MG

Influent Loadings

CBOD5	150 mg/L
TSS	150 mg/L
NH3-N	20 mg/L

Design Effluent Limits

CBOD5	15 mg/L
TSS	5 mg/L
NH3-N	6 mg/L

Influent Pump Station: 6 pumps rated at 9 MGD. 4 VFD pumps and 2 constant speed.

Mechanical Screens: 2 bar screens with 3/8" openings.

Vortex Grit Unit: Total flow grit removal.

Primary settling tanks: Three 40'x125'x10' basins. 33% BOD reduction.

Trickling filters: Three 123' diameter x 6' SWD. 49% BOD reduction.

Intermediate pump station: Four ABS submersible pumps rated at 9500 gpm each.

Aeration basin: Two 40'x175'x14.5' basins with fine bubble disc membrane diffusers. 2.9 hrs detention time at 12.5 MGD.

Final Clarifiers: Three 103'x10' and one 103'x14' tanks with density current baffle system.

UV Disinfection: Ultraviolet light disinfection equipment used to disinfect the plant effluent.

Sludge thickeners: Three 35' diameter tanks for thickeners for WAS and primary sludge.

Anaerobic digesters: One 100'x24' digester with dome gas handling cover. Two 75'x21' digesters (primary and secondary) which are feed from the 100' digester.

Dewatering building: Three Bird 150 gpm centrifuges with shaftless conveyor.

ACKNOWLEDGEMENTS

Kingsport Board of Mayor & Aldermen

CDM Constructors, Inc

CDM Smith, Inc

City of Kingsport Wastewater Staff

We are on the web!

http://publicworks.kingsporttn.gov/wwtp

A Brief History

The Kingsport WWTP, as originally constructed in 1957, consisted of screening, grit removal, primary clarification, chlorine contact, anaerobic digesters and sludge drying beds. The original design provided space for future primary clarifiers, up to four trickling filters, two final clarifiers and two additional digesters. In 1965, additions made to the facility included two tricking filters and a final clarifier. Upgrades to the treatment process were made again in 1985; additions included a third primary clarifier, a third trickling filter, and a third digester. This phase removed the sludge drying beds from service and converted the final clarifiers to an intermediate settling basin. New process additions to the plant in 1985 included a grit removal system, an aeration basin, final clarifiers, a sludge thickener and a dewatering building. In 2003, a vortex grit removal system (Pista-Grit) was added adjacent to the existing grit chamber.

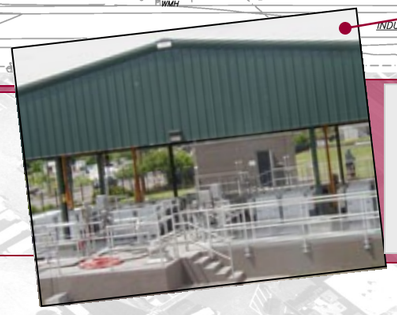
Centrifuge dewatering is the process of separating solids from water using centrifugal force generated by the rotation of a centrifuge bowl. The liquid flows along the screw conveyor in the center and exits at the end of the bowl.

A primary purpose of **Sludge Digestion** is to reduce the complex organic matter present in waste activated sludge into a simpler less objectionable state. Digestion produces a biosolids that is more amenable to dewatering and, ultimately, for disposal.

The term "**Activated Sludge**" is defined as a "biological process" which accelerates the decomposition of wastes in wastewater in a controlled environment. The controlled environment has three parts: organism growth, organism wasting, and the application of air. As the wastewater enters the controlled aerobic environment of the activated sludge basin, organisms such as bacteria, fungi, and protozoa, having a steady balance of food (naturally occurring in the wastewater) and oxygen (supplied by fine bubble diffusers), consume the waste as food and grow and reproduce.

The main purpose of the **Final Clarifiers** is to allow for separation of the liquid and solid portions of the mixed liquor suspended solids (MLSS). Since the MLSS has a higher specific gravity than the wastewater, the quiescent conditions in the final clarifiers allow the activated sludge to settle to the bottom and the supernatant passes over the v-notch weirs and into the clarifier launder to the disinfection system.

A two-stage **Odor Control System** is provided to eliminate odors from the screen area and the influent wet well.



Historically, gaseous chlorine has been used for disinfection at the Kingsport WWTP. However, due to the toxic nature of chlorine which can pose a danger to aquatic life, the chlorinated wastewater was dechlorinated following the chlorination process by means of the application of sulfur dioxide. For these reasons the chlorination/dechlorination systems have been replaced by an **Ultraviolet (UV) Disinfection System**. Disease producing microorganisms are present in all sanitary wastewaters and must be killed (disinfected) before treated wastewater can be discharged. Disinfection is any process used to destroy pathogenic organisms and eliminate the spread of disease.